Note on the revision and significance of the composite lagging business cycle indicator

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Introduction

1 The author wishes to thank Mr W S Pretorius for his valuable contributions in preparing this note.

The identification of new economic indicators, the discontinuation of existing indicators, as well as changes in the size and structure of the economy, necessitate revisions to the composite business cycle indicators from time to time. In March 2004 the South African Reserve Bank revised its composite leading and coincident business cycle indicators (Venter and Pretorius, 2004). As indicated at the time, the composite lagging business cycle indicator was revised separately and the results are published in this note. The composite lagging business cycle indicator was last revised in 1994 (Van der Walt and Pretorius, 1994).

The three composite business cycle indicators represent three samples of economic time series that are grouped together according to their ability to lead, coincide with or lag movements in the business cycle. Since each business cycle is unique, the behaviour of individual economic time series tends to vary during different business cycles, thereby affecting the degree of reliability of these individual time series as business cycle indicators from one business cycle to another. The combination of individual time series into composite indicators results in the composite indicators exhibiting more consistency and a more reliable timing relationship with changes in the business cycle than each individual economic time series in isolation. In addition, composite business cycle indicators tend to be smoother than their individual component time series due to the offsetting of measurement errors and other irregularities or random deviations in the individual time series when grouped with others.

The purpose of this note is firstly to describe and explain the changes made to the component time series of the composite lagging business cycle indicator. Secondly, the revised composite lagging business cycle indicator is evaluated in terms of its timing relationship with the reference turning points of the business cycle. In the final section the composite lagging business cycle indicator's importance and usefulness – often neglected during business cycle analysis – are highlighted.

Component time series of the composite lagging business cycle indicator

A revision of the component time series of the composite lagging business cycle indicator was deemed necessary when it recently became evident that some of these time series no longer consistently lagged movements in the business cycle. Similar to the component time series of the composite leading business cycle indicator (Venter and Pretorius, 2004:67), this breakdown in the relationship was, among other things, due to the implementation of changed policies and the opening up of new opportunities following South Africa's first all-inclusive democratic election in 1994.

Over and above the eight component time series previously incorporated into the composite lagging business cycle indicator, eight more indicators were evaluated. All of these indicators were subjected to the same evaluation system applied during the 1994 revisions. The main criteria for inclusion were:

- the economic significance of the process represented by the indicator;
- the statistical adequacy of the data;

- the historical conformity to and timing relationship with the business cycle;
- the smoothness of the time series; and
- the timeliness of the data.

On the basis of these criteria seven of the sixteen indicators were chosen. The eight components previously included in the composite lagging business cycle indicator and the new set of seven time series included in the revised composite lagging business cycle indicator are shown in Table 1. For methodology applied in compiling composite indices, see Van der Walt (1983) and Van der Walt and Pretorius (1994).

Table 1 Component time series of the composite lagging business cycle indicator

Previous components	New components
Value of non-residential buildings completed at constant prices	Value of non-residential buildings completed at constant prices
Value of fixed investment in machinery and equipment	Ratio of gross fixed capital formation in machinery and equipment to final consumption expenditure on goods by households
Value of industrial and commercial inventories at constant prices	Ratio of inventories to sales in the manufacturing and trade sectors
Nominal labour cost per unit of production in the manufacturing sector	Nominal labour cost per unit of production in the manufacturing sector (percentage change over four quarters)
Physical volume of building materials produced by the mining sector	Cement sales in tons
Value of unfilled orders as percentage of sales in manufacturing	Ratio of households' use of instalment sale credit to their disposable income
Employment in non-agricultural sectors	Predominant prime overdraft rate of banks
Total number of hours worked by production workers in the construction sector	

The only component time series that was retained unaltered in the revised composite lagging business cycle indicator is the value of non-residential buildings completed. The two component time series that were included for the first time are:
- the ratio of households' use of instalment sale credit to their disposable income; and
- the predominant prime overdraft rate of banks.

For different reasons, three previously utilised component time series were omitted from the new list of components of the composite lagging business cycle indicator, namely:

- The value of unfilled orders as a percentage of sales in the manufacturing sector, since Statistics South Africa discontinued the publication of data measuring unfilled orders in the manufacturing sector.

- The time series measuring the number of people employed in the formal non-agricultural sectors of the economy is now included in the composite coincident business cycle indicator (Venter and Pretorius, 2004:71).

- The time series depicting the total number of hours worked by production workers in the construction sector was omitted because of its inconsistency over time.

A number of component time series previously included in the composite lagging business cycle indicator were replaced by related or comparable series measuring similar economic processes. These include the following:

- The value of fixed investment in machinery and equipment that was replaced by the ratio of gross fixed capital formation in machinery and equipment to final consumption expenditure on goods by households.

- The value of industrial and commercial inventories at constant prices that was replaced by the ratio of inventories to sales in the manufacturing and trade sectors.

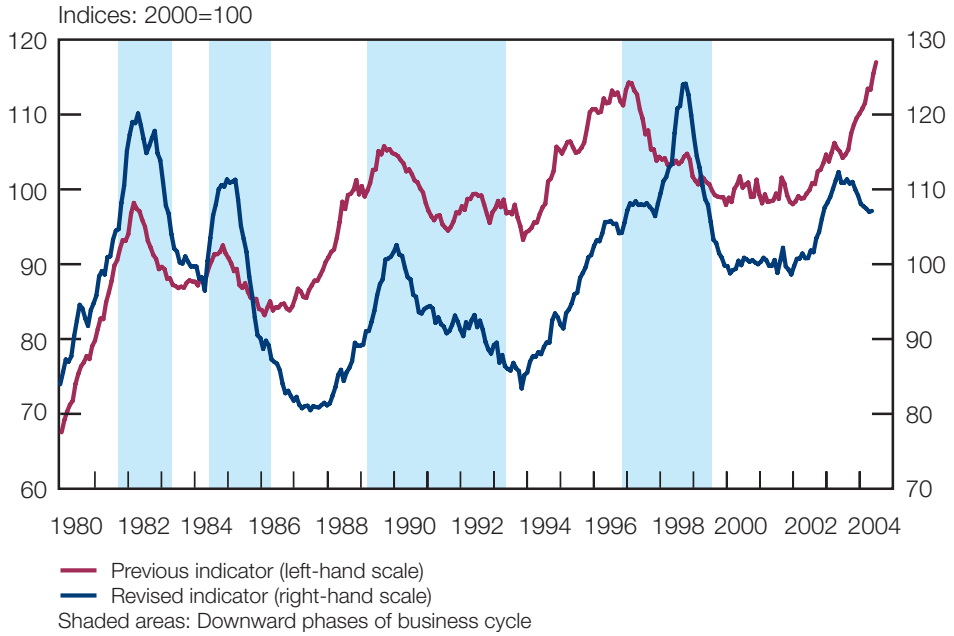
- Nominal labour cost per unit of production in the manufacturing sector that was replaced by the percentage change over four quarters in the same indicator.

- The physical volume of mining production of building materials that was replaced by cement sales in tons.

Timing relationship of the composite lagging business cycle indicator

The previous and the revised composite lagging business cycle indicators are shown in Graph 1. Since 1980, the revised composite lagging business cycle indicator has displayed a longer lag time than the previous composite indicator at all four of the subsequent business cycle peaks and at two of the four business cycle troughs.

Graph 1 Composite lagging business cycle indicator



Among the peaks, the difference between the previous and the revised composite indicators is most noticeable around the November 1996 business cycle peak. The

previous composite lagging business cycle indicator reached a peak in January 1997, roughly coinciding with the reference peak. The revised indicator only peaks in October 1998, thereby lagging the reference peak in the business cycle by 23 months. Similar improvements in the lag time of the revised indicator occurred at the business cycle troughs in March 1983 and March 1986.

The revised composite lagging business cycle indicator reached its most recent high point in May 2003, thereby following the movement in the composite coincident business cycle indicator. The previous composite lagging business cycle indicator failed to capture this downward movement in the coincident indicator.

The timing relationship of the previous and revised composite lagging business cycle indicators, as well as the reference turning points of the business cycle starting with the peak in August 1981, are shown in Table 2. It is clear from this table that the revised composite lagging business cycle indicator represents a significant improvement on the previous indicator, both in terms of the number of reference turning points lagged as well as the average number of months lagged.

Table 2 Timing relationship between the composite lagging business cycle indicator and reference turning points of the business cycle

Reference turning points		Timing relationship in months	
Peaks	Troughs	Previous indicator	Revised indicator
August 1981		+7	+9
	March 1983	+4	+14
June 1984		+5	+7
	March 1986	-1	+16
February 1989		+7	+12
	May 1993	+6	+6
November 1996		+2	+23
	August 1999	+28	+28
Average:		+7½	+14½
Median:		+5½	+13

A plus (minus) sign indicates that the indicator lags (leads) the reference turning point

The importance of the composite lagging business cycle indicator

The economic time series classified as lagging business cycle indicators tend to change direction after reference turning points in the business cycle have been reached, thereby confirming changes that were first indicated by the leading indicators and then the coincident indicators.

This behaviour displayed by the lagging indicators also assists business cycle analyses in providing an advance signal of a possible turning point in the business cycle. When the lagging indicators start to change direction they are the first to reflect imbalances that are intensifying or subsiding in the economy. The influence of movements in the lagging indicators on subsequent movements in the leading indicators helps to explain the view that one business cycle generates the next one. For example, a continued increase in the level of inventories (i.e. an increase in the lagging indicator) is likely to prompt a cutback in new orders (i.e. a decrease in the leading indicator). Likewise, an increase in the prime overdraft rate (i.e. an increase in the lagging indicator) may at some

stage result in decisions by home-owners and developers not to invest in new residential buildings, resulting in a reduction in the number of residential building plans passed (i.e. a decrease in the leading indicator). It is evident from the above-mentioned examples that feedback relationships exist between the lagging indicators and the subsequent turns in the opposite direction in the leading indicators. Stated differently, the turning points in the *inverse* of the lagging indicator should lead the turning points in the leading indicator.

Another way of determining whether imbalances in the economy are intensifying or subsiding is to view the movements in the lagging indicators relative to those of the coincident indicators. This comparison is expressed by the ratio of the composite coincident business cycle indicator to the composite lagging business cycle indicator. For example, if the lagging indicator increases at a slower pace than the coincident indicator (i.e. the ratio increases), this signals that scope exists for further economic expansion before constraints are likely to start emerging. Conversely, if the lagging indicator increases at a faster pace than the coincident indicator (i.e. the ratio decreases), this points to diminishing scope for further economic expansion as imbalances are developing at a faster pace than the economy is expanding.

Following from the analysis above, the sequence of related turning points in the composite business cycle indicators could, on average, be observed in the following chronological order:
- Firstly, the inverse of the composite lagging business cycle indicator;
- then the composite leading business cycle indicator;
- then the ratio of the composite coincident to the composite lagging indicator;
- then the composite coincident business cycle indicator, and
- lastly, the composite lagging business cycle indicator.

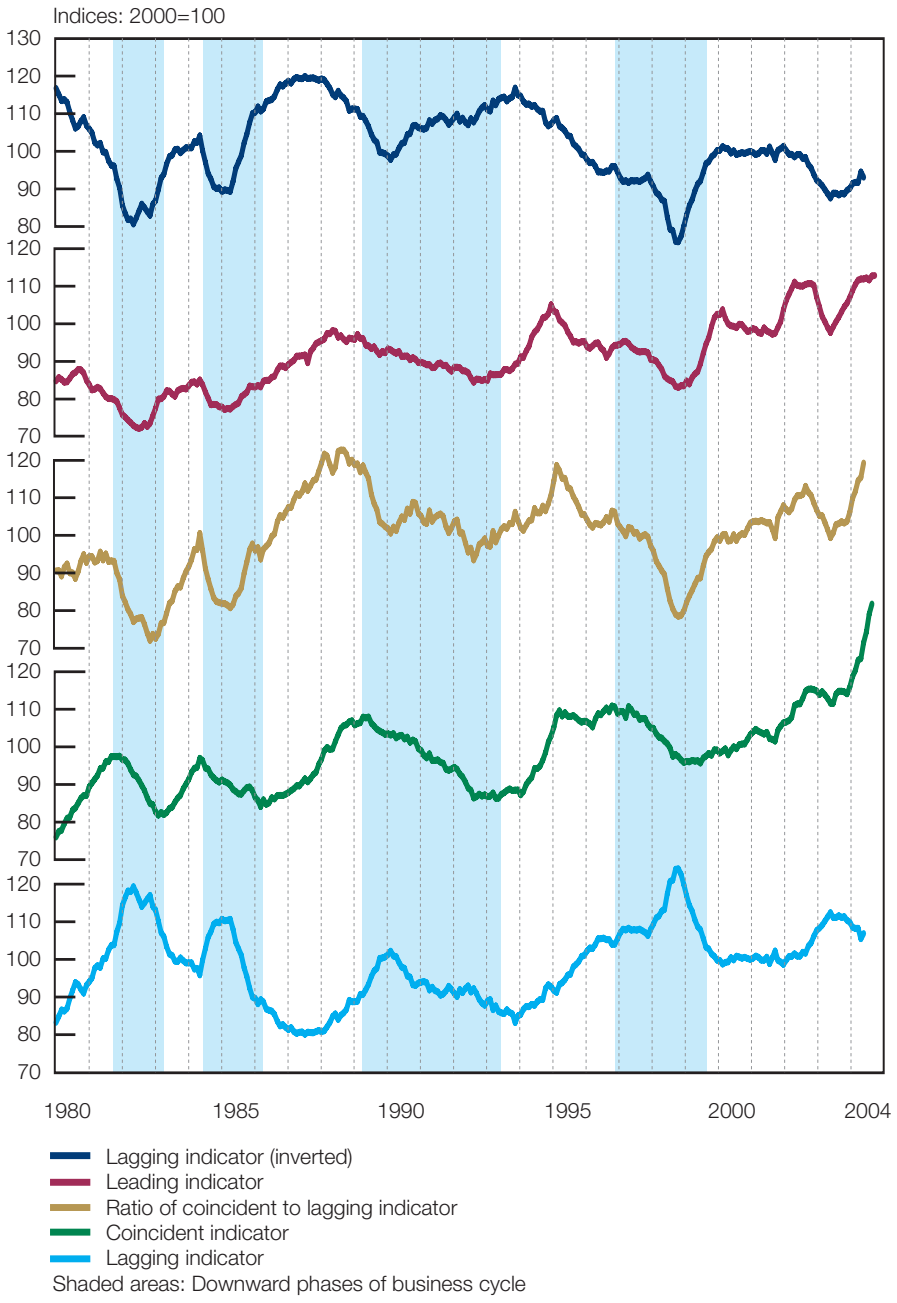
This chronological order based on the timing relationship between the reference turning points in the business cycle and the different composite business cycle indicator measures is confirmed by the current analyses and presented in Table 3, as well as in Graph 2, for the period since 1980.

Table 3 Timing relationship between the composite business cycle indicators and reference turning points of the business cycle

Reference turning points		Timing relationship in months				
Peaks	Troughs	Lagging indicator (inverted)	Leading indicator	Ratio of coincident to lagging indicator	Coincident indicator	Lagging indicator
August 1981		-30	-11	-3	+4	+9
	March 1983	-10	-8	-4	-1	+14
June 1984		-1	-1	-1	-1	+7
	March 1986	-14	-13	-11	0	+16
February 1989		-19	-9	-6	+4	+12
	May 1993	-39	-9	-9	-1	+6
November 1996		-36	-23	-21	-1	+23
	August 1999	-10	-10	-10	-2	+28
Average:		**-20**	**-10½**	**-8**	**0**	**+14½**
Median:		**-16½**	**-9½**	**-7½**	**-1**	**+13**

A plus (minus) sign indicates that the indicator lags (leads) the reference turning point

Graph 2 Composite business cycle indicators



Conclusion

The revised composite lagging business cycle indicator consistently lags the reference turning points in the business cycle by an average of 14½ months. The consistency and longer lag time of the revised composite lagging business cycle indicator increase its usefulness in business cycle analysis. The lagging indicator also provides a mechanism for the early identification of emerging imbalances in the economy, as well as the early identification of the dissipation of imbalances.

References

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